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DECLARATION

I, Neill, Mark, B. Eng., Brahmsstrasse 20/0, D-23556 Lübeck, Germany, do hereby declare that I am conversant with the English and German languages and am a competent translator thereof. I declare further that the following is a true and correct translation made by me of the text of the PCT-application with the publication number No. WO.....**00/69363**..... and with the amended claims as amended under Article 19 PCT and any amendment of the claims during the International Preliminary Examination procedure.

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TEETH CLEANING MEANS

"EXPRESS MAIL" MAILING LABEL

NUMBER EL701911890US

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Tooth cleaning means

The present invention relates to a tooth cleaning means consisting of at least one monofilament or multifilament thread.

Tooth cleaning means of the above mentioned type are known in many embodiment examples. In common language these are often known as dental floss. Mostly these tooth cleaning means consist of multifilament yarns in a waxed or unwaxed form. There are also known multifilament yarns as tooth cleaning means which have a strong texturing and are accordingly greatly changeable in length.

The above mentioned tooth cleaning means serves for cleaning tooth intermediate spaces from the remains of food or dental plaque. As is known the tooth intermediate spaces in the region of the chewing surfaces are mostly much smaller than in the region directly above the gum. The tooth cleaning means are accordingly formed such that they may just be led through the narrow tooth intermediate space in order then in the wider region to be able to unfold their cleaning effect. Since however the tooth cleaning means has a cross section which is considerably smaller than the tooth intermediate space present in this region, the cleaning effect is essentially dependent on the user guiding the tooth cleaning means along the surfaces to be cleaned. This is however neither particularly simple nor controllable. Added to this is the fact that an abrasive effect demands a certain spacial structure of the tooth cleaning means, and this structure is again an obstacle on introducing the tooth cleaning means into the region of the tooth intermediate spaces to be cleaned.

This problem until now has been counteracted in that one has offered tooth cleaning means, in particular dental cleaning floss of a varying thickness. A further hint of solving this problem was seen in offering tooth cleaning means which consist of multifilament yarns, wherein the threads of the yarns are textured by way of a suitable

method. By way of this these yarns in the unloaded condition have a considerably more voluminous cross section. Such tooth cleaning means are in particular used for cleaning below rigidly arranged tooth prostheses. With this the tooth cleaning means is pushed from the one side below a corresponding bridge and is pulled out at the other side. In contrast to other widespread dental floss thus a cleaning is not effected by a movement to and fro but by a one-off pulling-through of the tooth cleaning means. The abrasive effect at the same time is small. If one were to grasp this element on both sides and move it to and fro under tension, then in principle the texturing would fall away or be extended smooth by which means the volume is reduced and the abrasive effect which is in any case small is reduced even further.

It is therefore the object of the present invention to provide a tooth cleaning means which largely alleviates the previously mentioned disadvantages.

This object is achieved by a tooth cleaning means of the above mentioned type with the features of the characterising part of patent claim 1.

The effect is based on the fact that the monofilament or multifilament thread or threads with volumetric equality may be stretched to a multiple of its length, wherein the cross section is correspondingly reduced. On introducing the tooth cleaning means suitable force must be mustered in the form of tensile force and on the other hand the flanks of the teeth exert corresponding compression forces onto the tooth cleaning means to be introduced. The high-elastic monofilament or multifilament threads accordingly deform, wherein the cross sectional shape as well as the cross sectional area change. As soon as these forces reduce, which is automatically the case when the wider region of the tooth intermediate spaces has been reached then smaller forces are required and the cross section changes and the cross sectional surface is enlarged. By way of the textile processing of the thread or threads, the tooth cleaning means has a structure which practically according to the choice of the textile processing may effect a greater or lesser

abrasive effect. The abrasive effect may furthermore be influenced by the shaping of the cross sectional surface at least of one monofilament thread. If such a monofilament thread for example has a polygonal cross sectional surface thus this shaping together with the changes of running direction resulting from the textile processing effects a structure which has a particularly favourable abrasive effect.

Further advantageous embodiment forms of the subject matter of the invention are to be deduced from the dependent claims and their significance and manner of acting is explained in the subsequent description with reference to the accompanying drawings. There are shown in:

Figure 1 the introduction of the tooth cleaning means according to the invention into a tooth intermediate space and

Figure 2 the tooth cleaning means in the introduced condition;

Figure 3 a tooth cleaning means with cut connection locations in the unused condition;

Figure 4 a tooth cleaning means of at least two threads and

Figure 5 such a tooth cleaning means of a single thread;

Figure 6 shows the section of a multi-coloured, braided tooth cleaning means and

Figures 7

to 10 show one to four monofilament or multifilament threads in various textile processing variants.

As already mentioned the tooth cleaning means indicated in its entirety at 1 consists of one or more threads which each per se may in turn be monofilament or multifilament and consist of high-elastic material. With respect to the highly elastic materials being considered here one is to mention LYCRA (a trademark of the company Du Pont) or DORLASTAN (a trademark of the company Bayer AG). Apart from the above mentioned plastic threads also in particular monofilament threads of rubber-like plastic or of natural latex are to be considered. In all variants one would usually preferably employ products which have been authorised with regard to foodstuff compatibility and medical technology.

On introducing the tooth cleaning means 1 into the intermediate space between two teeth 2 the tooth cleaning means 1 is held under tension as this is evident in Figure 1. By way of the prevailing tensile load the tooth cleaning means for example as a braiding of highly elastic -threads on the one hand lengthens and on the other hand with respect to its cross sectional area considerably reduced. Accordingly it may be introduced into the relatively narrow tooth intermediate space without getting caught. When the tensile loading is relieved then the highly elastic threads contract and their cross sectional area correspondingly increases. With this they completely fill out the tooth intermediate space also when this is larger than the introduction region. This situation is represented in Figure 2.

With regard to manufacturing technology the tooth cleaning means may be manufactured practically endlessly. At regular distances the formation of one or more threads which is manufactured by textile processing may be formed at relatively short distances into connection or separation locations. These connection or separation locations 3 may be manufactured by adhesing, pressing or welding. The main object of these connection or separation locations lies in defining regions in which the endless product may be severed without at the same time the textile formation coming apart. On the market at the same time the endless product may be offered with the connection

locations at regular distances or also part pieces which are already separated at this region as this is represented in Figure 3. With the separation one would preferably apply an oblique cut which simplifies a leading through of the tooth cleaning means for example under a tooth bridge. At the same time of course with the endlessly manufactured product the part sections may be predefined by way of suitable perforation cuts or other formed break-off locations, and inspite of this offer an endless product, for example in the wound up condition.

Figure 4 is to be understood purely symbolically. With this it is to be merely shown that for example a tooth cleaning means 1 is manufacturable by connection in the end regions 3, wherein the one thread 4 may be manufactured of another product than the second thread 5. The difference between the two threads 4 and 5 may lie in the material selection or with the same material selection in the colouring. Such a coloured indication may for example as customer information fullfill an object. Thus according to colour code various thicknesses may be offered or the colour code may indicate also various application purposes, such as the cleaning of tooth intermediate spaces on the one hand or for the cleaning of intermediate spaces between the gums and the tooth bridge. The threads may however also be different in the structure. Whilst the one thread 4 for example may have a smooth surface, the other thread 5 may have a structured surface.

There also exists the possibility that the one thread has a round cross sectional shape whilst the other thread has a polygonal shape. These structure differences and cross sectional shape differences serve in particular for increasing or reducing the abrasive effect the connection of the two threads with regard to textile processing is not taken into account here. This is of course to be effected beforehand. In a similar representation in Figure 5 there is shown a tooth cleaning means 1 which may be manufactured of a single thread 5 in a looped form. Here too then the two counter-running cord sections of the thread 4 may be connected to one another with regard to textile processing.

The selection of the colours however has considerable advantages for the user. If one used threads with a bright colour then one may recognise very quickly with these whether a bleeding of the gums is present. If one used threads with a dark colouring then on these one may easily recognise impurities. It is therefore advantageous for the user to use a tooth cleaning means which consists of a combination of in each case at least one bright and at least one dark colour tone.

If the tooth cleaning means is manufactured of a single thread then above all one considers as a textile processing the manufacture in the form of knotting and knitting as this is for example represented in Figure 7 with which a single thread is represented in an considerably enlarged scale. With the use of two monofilament or multifilament threads as a textile processing method in particular doubling is to be considered. This is shown here in Figure 8. In Figure 9 in contrast there is represented a manufacturing method for three threads, wherein as a textile processing there is shown a braiding method here. This also is the case with the method shown in Figure 10, wherein here the tooth cleaning means is formed of four threads.

Of course also tooth cleaning means are to be considered which are manufactured of even more various or similar threads. It is however not meaningful to use too many threads in a very thin quality since then by way of this there finally arises a formation with regard to textile processing which practically has no structure which could still effect a meaningful abrasive operation.

In particular for cleaning below teeth bridges also more voluminous elements are to be considered. Thus tooth cleaning means for this purpose may also consist of a knitted fabric which not as with them forms represented here does not have a cord-like structure but has a wick or tubing shape. Finally it is of course also possible to coat the whole tooth cleaning means or also only individual threads with tooth or gum care means. Such

means are known on the market in large amounts and with the manufacture of the threads may be applied without problem.

Finally it is yet to be pointed out that apart from the already mentioned possibilities of the manufacture of the connection locations by adhering, pressing or melting there yet also exists the possibility of creating such connections by third materials which may be deposited in this region.

Purely by way of example the application of shrink tubing sections or sleeve-like plastic elements which may be suitably clamped on with welding technology are also referred to.

List of reference numerals

- 1 tooth cleaning means
- 2 teeth
- 3 connection separating locations
- 4 a first thread
- 5 a second thread